The objective of this study was to test whether the temporal patterns of VT recurrences in patients with implantable cardioverter-defibrillator (ICD) follow a random or a clustered pattern by mathematical modeling. **METHODS: D**ata analysis was conducted using the Medtronic Gem DR database of 521 ICD patients. Patients with ≥ 3 spontaneous VT detections during follow up were studied. The times between consecutive treated VT detections (inter-event interval) for each patient were compared to an exponential model of random recurrences and a Weibull model to test for clustering of recurrences. **RESULTS:** 71 patients had ≥ 3 VT episodes during a mean follow-up of 131 days. A total of 2347 VT episodes were recorded (33±65 episodes/patient, median 10 episodes / patient). Patient age 66±13 years, 78% male, 83% coronary artery disease, ejection fraction 31±11%, 63% taking antiarrhythmic drugs. The inter-event interval was less than 1 hour for 78% of all intervals and was less than 91 hours for 94% of inter-event intervals. By the Kolmogorov Smirnov goodness-of-fit test, 38 out of 71 patients (53.5%) showed that the distribution of inter-detection intervals differed from an exponential model ($p < 0.01$ for each patient, $p = 0.65$ for proportion of patients similar to chance), while only 11 out of 71 patients (15.5%) showed that the distribution of inter-detection intervals differed from a Weibull model ($p < 0.01$ for each patient, $p < 0.001$ for proportion of patients similar to chance). **CONCLUSION:** The recurrence pattern of treated VT events in ICD patients are clustered and are more frequently described by a Weibull distribution than a random distribution. The time between consecutive treated VT detections is usually < 1 hour and infrequently > 91 hours. Knowledge of this pattern may help to design studies of new antiarrhythmic therapies.

1053-213 The Predictive Value of Electrophysiologic Testing: Subgroup Analysis in the Dual Chamber and VVI Implantable Defibrillator (DAVID) Trial

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Background: The DAVID Trial evaluated whether dual-chamber pacing was superior to single chamber pacing in patients (pts) with an ejection fraction of less than 40% who were receiving an implantable cardioverter-defibrillator (ICD). The result of a baseline electrophysiologic study (EPS) in trial pts was reviewed to determine if inducibility of ventricular arrhythmias predicted outcome.
Methods: A total of 506 pts were enrolled in the DAVID Trial. Baseline EPS was recommended but not required except for pts enrolled because of unexplained syncope. The induction protocol involved up to 3 premature extrastimuli at 2 drive cycle lengths from up to 2 sites in the right ventricle. Induced arrhythmias were classified based on morphology, rate, and duration.
Results: Of the pts enrolled in the trial, 313 had a baseline EPS. A comparison of demographic and clinical parameters between the pts who underwent EPS and those who did not revealed few substantial differences. At the time of EPS 81% of pts were on drug therapy, including 60% who were on beta blockers, 29% on digoxin, 10% on calcium blockers, and 15% on Class I or III antiarrhythmic drugs. The worst arrhythmia induced was sustained VF in 40 pts, sustained monomorphic VT > 250 bpm in 72 pts, sustained monomorphic VT 201-250 bpm in 106 pts, sustained monomorphic VT 150-200 bpm in 34 pts, sustained monomorphic VT < 150 bpm in 10 pts, sustained polymorphic VT in 31 pts, non-sustained polymorphic VT in 5 pts, non-sustained monomorphic VT in 3 pts, less than 15 beats of VT in 3 pts, and no VT in 9 pts. Kaplan-Meier survival analysis showed no significant difference between inducibility or non-inducibility of the rhythm classifications with respect to the time to first recurrent arrhythmia, time to first inappropriate therapy or time to first re-hospitalization, but time to the primary endpoint (death or hospitalization for congestive heart failure) was shorter for non-inducible patients and longest for patients with VF or polymorphic VT induced (p=.01).
Conclusion: In the DAVID pts who underwent EPS, inducibility of VT/VF appears to predict outcome with regard to survival / hospitalization for heart failure, but not for future ICD therapies or hospitalization in general.

POSTER SESSION

1071

Pulmonary Vein Isolation to Treat Atrial Fibrillation II

Monday, March 08, 2004, 9:00 a.m.-11:00 a.m.
Morial Convention Center, Hall G
Presentation Hour: 10:00 a.m.-11:00 a.m.

1071-207 Expedited Geometric Rendering of Left Atrium and Pulmonary Veins Using Multipoint Electroanatomical Mapping

Martin D. Lowe, Laurie A. Peterson, Douglas L. Packer, Mayo Clinic, Rochester, MN

Background: Conventional electroanatomic mapping of the left atrium (LA) and pulmonary veins (PVs) can be both time-consuming and laborious. An accelerated mapping capability with simultaneous acquisition of multiple points would be clearly advantageous in facilitating AF ablation.
Methods: We compared integrated multipoint electroanatomical mapping and geometric rendering of LA and PVs with tip mapping alone in 17 patients undergoing AF ablation. Eight patients (3 paroxysmal, 5 persistent AF) underwent mapping of LA and each PV with a multipolar catheter (QwikStar, Biosense), that allowed simultaneous acquisition of tip, shaft and trace point data from its distal 6 cm. Nine patients who underwent tip mapping alone (NaviStar, Biosense), were used as controls. Study patients had an ejection fraction of 48 ± 16 %, an LA size of 44 ± 3 mm, and had failed 3.1 ± 1.3 antiarrhythmic drugs, all values similar to controls.
Results: The LA was mapped and geometrically rendered much faster in study patients than controls (11 ± 5.8 vs. 23 ± 12 minutes). In addition, multipoint mapping with 53 ± 29 tip, 83 ± 31 shaft and 84 ± 117 trace points required less catheter manipulation than control patients where 111 ± 57 tip points were needed for adequate rendering of LA anatomy. In study patients PV mapping required 3.5 ± 2.1 minutes with the LSPV rendered using 22 ± 7 tip points and 76 ± 41 shaft points, LIPV 25 ± 8 and 69 ± 43, RSPV 24 ± 6 and 49 ± 36, and RIPV 20 ± 6 and 44 ± 30, tip and shaft points. PV trace points were not required to obtain optimal venous geometry. In controls PVs were mapped in 3.4 ± 2.8 minutes per vein with 62 ± 28 tip points. Although PV mapping times were similar in both groups, simultaneous multipoint mapping required less catheter movement and tip point acquisition. The greater number of points in LA and PVs obtained in the study group allowed for a more qualitatively precise geometric rendering of LA and PVs with clearer demarcation of PV ostia.
Conclusion: This study demonstrates substantial reduction in LA mapping time by integrated tip and shaft point mapping. The creation of a more anatomically correct rendering of the LA-PV junction may facilitate ablative intervention, with improved targeting of energy delivery.

1071-208 Circumferential and Combined Technique in Cryoisolation of Pulmonary Veins: The "Arctic Circler" Experience

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Discrete sequential single pulsed isolation of the pulmonary veins (PV) with radiofrequency (RF) or cryotechnique with a 6-mm tip catheter is associated with many ostial impulses and in RF with the risk of PV stenoses.
Guided by a 20-pole Lasso catheter before and after ablation, proximal PV isolation was performed using the self-expanding arctic circler (AC) with a maximum of 30 mm in diameter over 4 minutes of cryoimpulses (CI) at a temperature of -75 °C to -90°C (with N_2O cryo technique). Electrical gaps were closed under Lasso guidance using a 6-mm tip cryocatheter (freezor xtra, Cryocath, Canada).
Of 35 patients (P) (9 women, age 59±7 years refractory to antiarrhythmic therapy, 33 with paroxysmal, 2 with persistent atrial fibrillation (AF), mean duration 87±70 months) 22 were treated in a first attempt, 13 after ablation 3 months ago because of AF recurrence. Of 125 PV 15 were re-isolated with the 6-mm tip cryocatheter because of single or few inputs only. One hundred and ten PV were isolated with the arctic circler alone in 54% (59 PV), with additional gap closing by the freezor in 46% (51 PV). Gap closing was more (70%) required in the left upper PV (Table). There were no acute PV stenoses nor stenoses after 3 months.
Conclusion: AC isolation of PV is successful in 54% with few CI only and in 100% with additional gap closing with a conventional cryoablation.

Tab. 1

Targeted PV	Cryoimpulses with AC	Isolation AC	Isolation AC + Freezor	Cryoimpulses Freezor	Isolation %	Diameter mm
Left upper (n=31)	5.4±1.6	11 (30%)	20	6.4±5	100	18±4
Left lower (n=23)	3.6±1.1	15 (65%)	8	5.0±2	100	17±2
Right upper (n=29)	4.4±1.4	17 (58%)	12	5.0±3	100	17±3
Right lower (n=27)	3.3±0.9	16 (59%)	11	4.0±2	100	17±3

1071-219 Remodeling of the Left Atrium and Pulmonary Veins Following Catheter Ablation of Atrial Fibrillation

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Background: Catheter ablation of atrial fibrillation (AF) has been shown to be a curative approach for treatment of AF. The purpose of this study was to determine to what extent catheter ablation of AF results in reverse remodeling of left atrial and pulmonary vein (PV) size.
Methods: The patient population was comprised of 54 patients (40 male, 54+11 years) who underwent catheter ablation for AF. Each patient had a gadolinium enhanced magnetic resonance scan prior to and 6-8 weeks following ablation. The diameters of the PVs and the oblique axial, coronal, and sagital dimensions of the left atrium were determined. The left atrial volume was then calculated.
Results: The mean ± SD decrease in LA Volume was 12 ± 22% ($p<0.001$). The mean ± SD decrease (mm) in the PV diameter was from 18.1 ± 2.9 to 16.6 ± 3.1 in Left Superior (LS) PV, 17.5 ± 3.2 to 15.4 ± 4.0 in Left Inferior (LI) PV, 19.5 ± 3.5 to 17.1 ± 4.1 for Right Superior (RS) PV and 19.0 ± 3.8 to 17.8 ± 4.3 in Right Inferior (RI) PV ($p<0.01$ for each). LA volume change had a linear correlation with the reduction in diameter of each of the four PVs. Percent change in diameter of each PV ostium showed correlation with percent change in diameter of the other ostia except for LSPV and RIPV (figure). Overall, percent change in diameter of ostia of all PVs correlated with the percent change in LA volume ($p<0.01$).